United States Patent [19]

Inoue

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[54] **COMPACT PAPER PUNCH**

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[52] **U.S. Cl.** **30/358;** 83/618

[51] **Int. Cl.²** **B26F 1/04**

[58] **Field of Search** 30/358, 368; 83/618

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[57] **ABSTRACT**

A hand-held paper punch comprises a housing having a plunger reciprocally mounted thereon to engage a pair of pivotally mounted levers adapted to depress a pair of spring-biased punch dies for paper punching purposes. A receptacle is releasably mounted on a bottom of the housing to receive paper scrap and further defines an elongated opening for inserting one or more sheets of paper beneath the punch dies.

19 Claims, 4 Drawing Figures

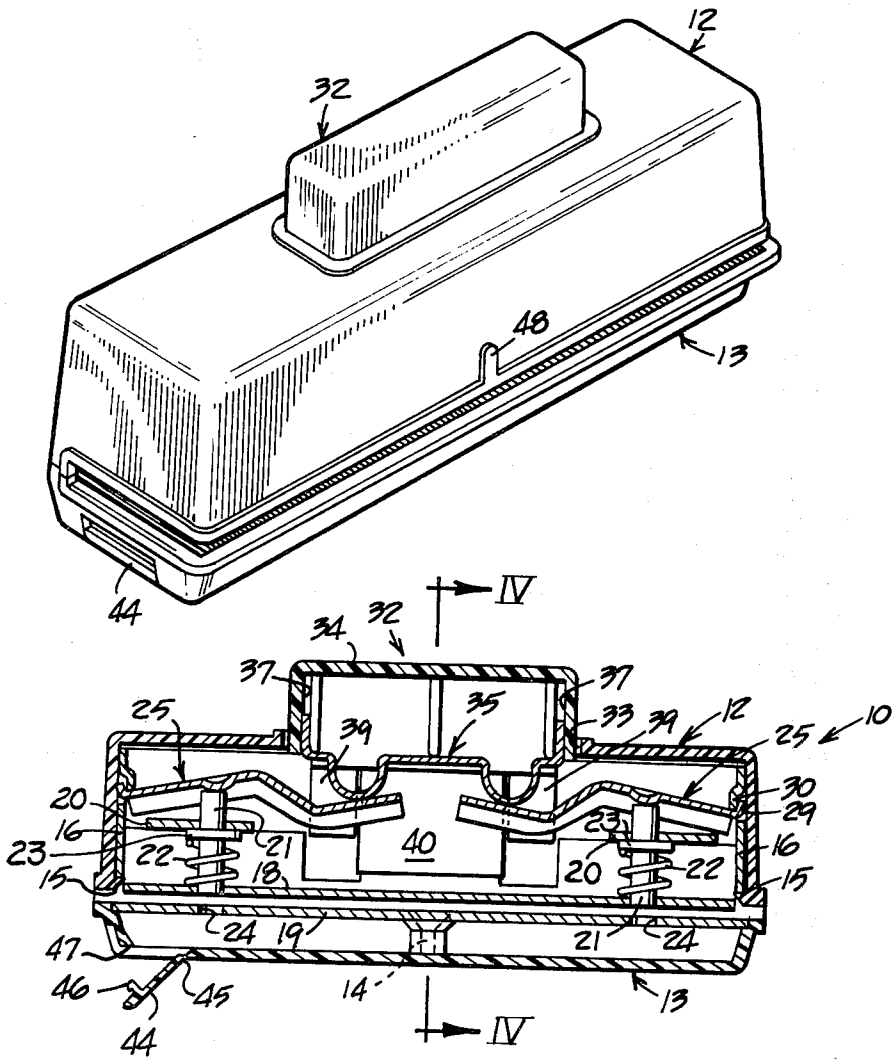


FIG. 1.

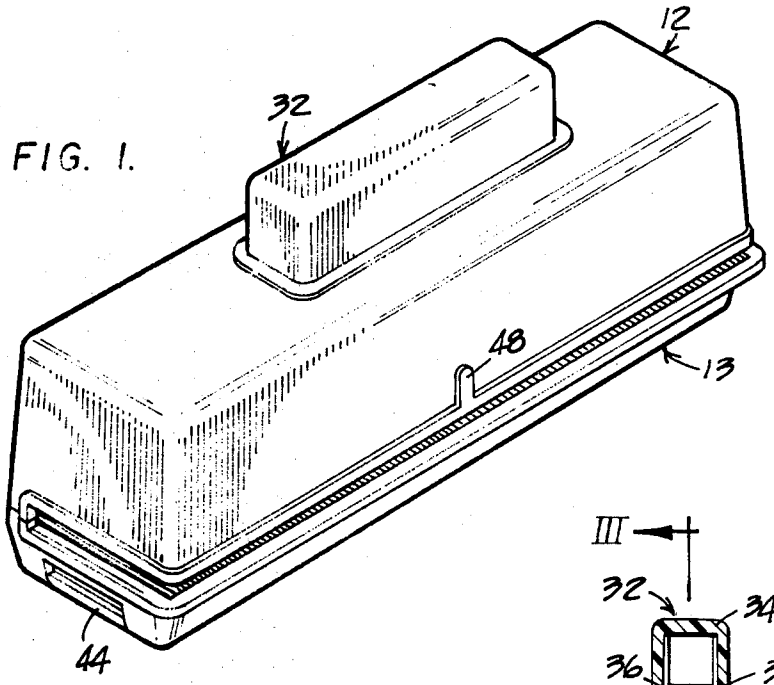


FIG. 4.

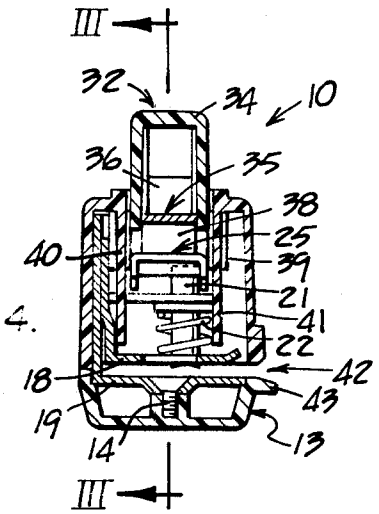
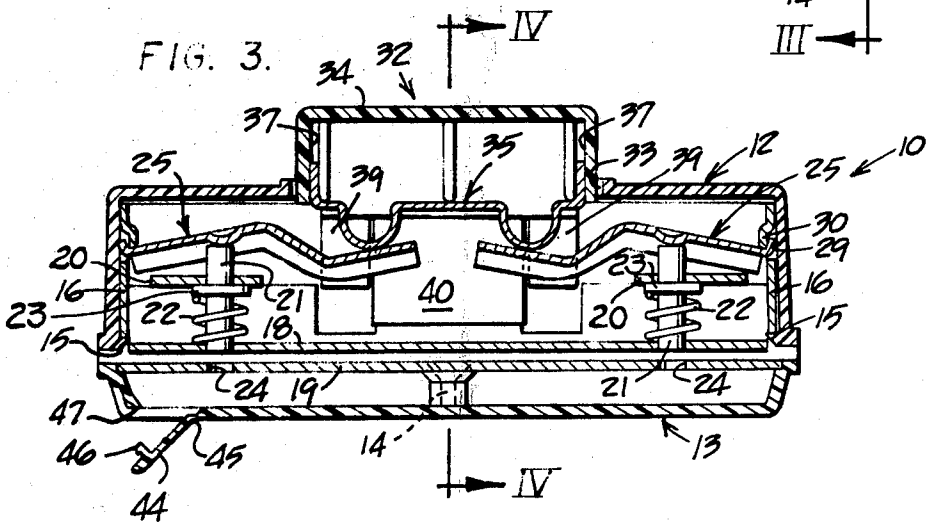


FIG. 3.



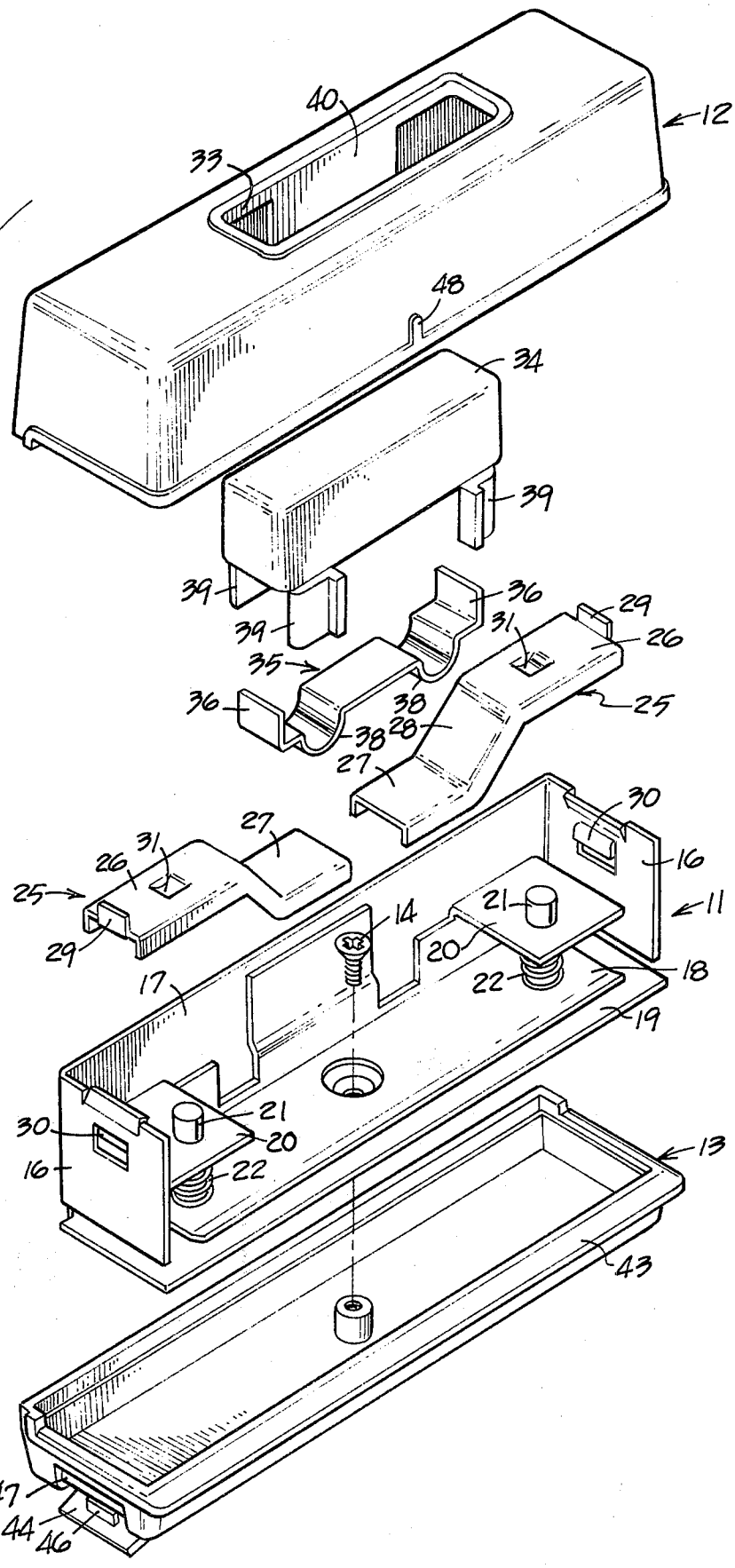

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FIG. 2.

COMPACT PAPER PUNCH

BACKGROUND OF THE INVENTION

Conventional paper punches normally comprise a base having a pair of upwardly biased punched dies reciprocally mounted thereon. A hand lever is normally pivotally mounted on the base to engage the punch dies to reciprocate them simultaneously for paper punching purposes. A receptacle is normally defined on the bottom of the base and enclosed by a removable bottom cover to collect paper scraps accumulated pursuant to such punching. Such conventional paper punches are unwieldy to handle, expensive to manufacture and oftentimes tend to bind, thus requiring complete dismantling thereof for servicing purposes.

SUMMARY OF THIS INVENTION

An object of this invention is to provide a compact and economical paper punch adapted for efficient operation and expeditious servicing should the need arise. The paper punch comprises an elongated housing, a pair of longitudinally spaced and parallel punch dies reciprocally mounted in the housing, actuating means movably mounted in the housing to selectively engage and reciprocate the punch dies and plunger means movably mounted on the housing for selectively engaging the actuating means to thus reciprocate the punch dies.

In the preferred embodiment of this invention, the housing is formed in three parts, namely; a base portion having the punch dies reciprocally mounted thereon, a cover portion for substantially covering the base portion and a tray portion detachably mounted to the base portion to fully enclose the same and to function as a receptacle for receiving paper scraps resulting from the punching operation. Another novel feature of this invention is to constitute the actuating means by a pair of levers disposed in longitudinal disposition along the longitudinal axis of the paper punch to further increase the compactness thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects of this invention will become apparent from the following description and accompanying drawings wherein:

FIG. **1** is a front perspective view of a paper punch embodying this invention;

FIG. **2** is an exploded perspective view of the elements constituting the paper punch;

FIG. **3** is a longitudinal sectional view through the paper punch, taken in the direction of arrows III—III in FIG. **4**; and

FIG. **4** is a transverse cross sectional view through the paper punch taken in the direction of arrows IV—IV in FIG. **3**.

DETAILED DESCRIPTION

FIGS. **1** and **2** illustrate a paper punch **10** having a housing comprising a metallic base portion **11**, a plastic cover portion **12** and a plastic bottom or receptacle portion **13**. The base portion may be releasably attached to the receptacle portion by a screw **14** whereas the cover portion may be snapped into locked engagement with the base portion, to form an elongated housing along with the receptacle portion, by means of a pair of resilient lugs **15** (FIG. **3**) formed internally thereon to each engage under a lower edge of a respective end plate **16** formed integrally on the base portion. Thus, the paper punch is adapted for expeditious assembly as well as for expeditious servicing, should the inner workings thereof require such attention.

At best shown in FIG. **2**, the base portion comprises a pair of stamped members suitably welded together to form a back plate **17** having end plates **16** secured on either end thereof. In addition, the base portion comprises a pair of vertically spaced and horizontally disposed lower plates **18** and **19**. A pair of horizontally disposed plate portions **20** are cantilevered on back plate **17**.

Punching means include a pair of longitudinally spaced and parallel cylindrical plunger-type punches or male dies **21**, each reciprocally mounted on a respective upper plate **20** and biased upwardly by spring means. Such spring means preferably comprises a coil spring **22** mounted on the punch in compressed relationship between plate **18** and a washer **23** secured in place on the punch. The punch projects through plate **18** and a female die **24** is defined by a like-shaped aperture formed through plate **19** (shown in FIG. **3**) to underlie and reciprocally receive the punch for paper punching purposes. The punching means further includes actuating means, preferably in the form of a pair of levers **25**, disposed in aligned relationship along a longitudinal axis of the paper punch and mounted in the housing for selectively engaging and reciprocating the punches simultaneously.

Each lever comprises a pair of offset and at least generally parallel first and second end portions **26** and **27** respectively, and an intermediate portion **28**. A first lug **29** is formed on the end portion **26** to engage under a second lug **30** formed on end wall **16** of the base portion to provide pivot means to pivot the lever thereat. A convex bearing button **31** is formed out of end portion **26** of the lever to engage the head of punch **21** in anti-friction bearing contact therewith, i.e., line contact.

Referring to FIGS. **3** and **4**, the punching means further includes a rectangularly shaped plunger means **32** reciprocally mounted in a like-shaped aperture **33** formed through an upper wall of cover portion **12** of the housing. The plunger comprises a plastic cup-shaped body **34** and a generally U-shaped stamped insert **35** having a pair of legs **36** each slip-fitted within a like-shaped slot **37** defined within an open, lower end of the body. Thus, it can be seen that manual depression of plunger **32** will function to move convex bearing portions **38**, formed integrally on insert **35**, into bearing contact with the levers to pivot them about their pivoted ends **26** to simultaneously reciprocate punches **21**.

It should be noted that opening **33** is preferably slightly larger than the perimeter of body **34** of the plunger to provide a slight manufacturing tolerance therebetween, thereby the plunger does not have to be precisely reciprocated vertically during the punching operation. End portions **27** of the levers preferably normally diverge upwardly towards each other, as shown in FIG. **3**. Such divergence aids in precisely maintaining the operative positions and bearing contacts of bearing portions of the plunger on the levers during the punching operation.

As further illustratex in FIGS. **2**, **3** and **4**, a downwardly extending leg **39** is formed integrally at each corner of body **34** of the plunger. The legs straddle end portions **27** of the levers and are guided during recipro-

cation of the plunger by guide means comprising a pair of downwardly extending partitions **40** and **41** formed integrally on cover **12** to have a pair of the legs straddle the ends of each partition. The plunger is thus prevented from moving longitudinally and laterally by the partitions during all phases of the punching operation.

Referring to FIGS. **3** and **4**, plates **18** and **19** of base portion **11** and opposed edges of the cover and receptacle portions are spaced vertically to define an elongated and horizontally disposed slot **42**, the full length and substantially the full width of the paper punch, which cooperates with a co-extensive lip **43** formed on receptacle portion **13** to receive paper therein. A trap door **44** is connected on a bottom wall of the receptacle portion, at a hinge line **45**, to facilitate emptying thereof. A free end of the trap door has a latch **46** integrally formed thereon to engage lip **47** formed on such bottom wall to snap the trap door in a normally closed position.

In use, one or more sheets of paper may be suitably positioned in slot **42** of the hand-held paper punch. A centrally disposed indicia **48** (FIG. **1**) is formed integrally on a front wall of the cover portion to provide a center guide for precisely punching holes in paper. Depression of plunger means **32** will function to pivot levers **25** to reciprocate punches **21** through the paper and into female dies **24**.

The paper scraps collect in the closed chamber of receptacle portion **13** and may be removed via trap door **44**, shown in its open position in FIG. **3**. Springs **22** will function to automatically raise the punches, levers and plunger means to their normal, FIG. **3** position upon release of the plunger means by the operator. In the event that servicing of the paper punch may be required, it can be dismantled expeditiously by merely unsnapping lugs **15** and by removing single set screw **14**, if necessary.

I claim:

1. A paper punch disposed on a longitudinal axis thereof and comprising

a pair of longitudinally spaced and parallel male dies reciprocally mounted therein for movement transverse to said axis,

actuating means movably mounted in said paper punch for selectively engaging and reciprocating each of said male dies and

plunger means reciprocally mounted on said paper punch for selectively engaging and moving said actuating means to reciprocate said male dies simultaneously, said actuating means comprising a pair of levers pivotally mounted on a base portion of said paper punch and wherein each of said levers has a pair of offset and at least generally parallel first and second end portions, each said first end portion pivotally mounted on a respective end wall of said base portion and engaging an upper end of a respective male die and said plunger means engaging said second end portions.

2. The paper punch of claim **1** further comprising a spring means operatively connected between each of said male dies and said base portion for biasing said male dies, said actuating means and said plunger means upwardly.

3. The paper punch of claim **1** wherein said levers are disposed in parallel relationship relative to the longitudinal axis of said paper punch.

4. The paper punch of claim **1** further comprising a bearing button formed on each of said first end portions and engaging the upper end of a respective male die in bearing contact therewith.

5. The paper punch of claim **1** further comprising a receptacle portion attached to a bottom of said paper punch and defining a closed chamber adapted to receive punched paper scraps therein.

6. The paper punch of claim **5** further comprising a normally closed trap door movably mounted on a bottom wall of said receptacle portion to be opened for removing said paper scraps from said chamber.

7. The paper punch of claim **1** wherein said paper punch has an upper wall and said plunger means is reciprocally mounted in an aperture formed through the upper wall of said paper punch.

8. The paper punch of claim **7** wherein said plunger means comprises a cup-shaped body having its open, lower end disposed in said aperture and a generally U-shaped insert having a pair of legs thereof slip-fitted within said body.

9. The paper punch of claim **8** wherein a pair of convex bearing portions is formed on said insert, each of said bearing portions engaging said actuating means in bearing contact therewith.

10. The paper punch of claim **7** further comprising cooperating guide means formed on said plunger means and extending downwardly from said upper wall for guiding reciprocal movements of said plunger means.

11. The paper punch of claim **10** wherein said guide means comprises a downwardly extending leg formed integrally at each corner of said plunger means and a pair of partitions secured to said upper wall, a pair of said legs straddling ends of a respective one of said partitions.

12. The paper punch of claim **1** further comprising means forming a pair of longitudinally spaced apertures, each defining a female die, each underlying a respective male die to receive the same upon reciprocation thereof by said actuating means.

13. The paper punch of claim **12** comprising separable cover, base and receptacle portions releasably connected together, said cover and receptacle portions forming a housing enclosing said base portion, said receptacle portion defining a closed chamber therein adapted to receive paper scraps and said male dies reciprocally mounted on said base portion.

14. The paper punch of claim **13** wherein said base portion comprises a back plate having a pair of longitudinally spaced and horizontally disposed plate portions secured thereon, one of said male dies reciprocally mounted in each of said plate portions.

15. The paper punch of claim **13** wherein said base portion comprises a pair of vertically spaced and horizontally disposed lower plates, a lower one of said lower plates having said female die defining apertures formed therethrough.

16. The paper punch of claim **15** wherein said plates and opposed edges of said cover and receptacle portions are spaced vertically to define an elongated and horizontally disposed slot the full length and substantially the full width of said paper punch.

17. The paper punch of claim **13** wherein said cover portion is releasably connected to said base portion and said receptacle portion is releasably connected to said base portion.

18. The paper punch of claim 17 wherein said cover portion is releasably connected to said base portion by a plurality of resilient lugs each normally locked into engagement with said base portion.

19. The paper punch of claim 17 wherein said receptacle portion is releasably connected to said base portion by releasable fastening means extending through a plate of said base portion and threadably attached to said receptacle portion.

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